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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,415	11/20/2003	Mihri Ozkan	034044.028	5544

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EXAMINER

KEANEY, ELIZABETH MARIE

ART UNIT PAPER NUMBER

2882

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/716,415

Applicant(s)

OZKAN ET AL.

**Examiner**

Elizabeth Keaney

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/20/03 and 4/3/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The Amendments and Remarks filed 15 November 2005 have been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-3,5-10,12,16,17-21 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Jain et al. (US Patent 6,797,412; hereinafter Jain).

Re claim 1: Jain discloses, in figure 10a and throughout the disclosure, a multilayer polymer-quantum dot light emitting diode comprising:

- at least one aqueous soluble (column 5, lines 2-3) quantum dot layer (63) between a first polymer layer (62) and a second polymer layer (64).

The Examiner notes Jain discloses the quantum dot layer to be comprised of ZnCdSe/ZnSe or ZnCdSe/ZnSSe. This material is considered to be aqueous soluble.

The Examiner further notes that the limitation “a spun coat second polymer” is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, a second polymer layer (64), the process limitation is afforded no patentable weight.

Re claims 2 and 3: The Examiner notes that the limitations “formed using...dots” and “aqueous suspension...stable” is drawn to product by process limitations. While the Examiner has addressed the implied structure produced by the process, a layer of quantum dots (63), the process limitation is afforded no patentable weight.

Re claim 5: Jain discloses at least one of the polymer layers comprising a low molecular weight compound selected from the group consisting of polyaromatics and polyheteroaromatics (column 6, line 46).

Re claim 6: Jain discloses at least one of the polymer layers comprises a high molecular weight compound selected from the group consisting of non-conjugated polymers and conjugated polymers (column 6, lines 46-47).

Re claim 7: Jain discloses the first polymer layer comprising a hole conducting polymer (column 6, lines 40-41).

Re claim 8: Jain discloses the second polymer layer comprising an electron conducting polymer (column 6, lines 42-43).

Re claim 9: Jain discloses the organic molecule layer comprises electron conducting organic molecule (column 6, lines 42-43).

Re claim 10: Jain discloses the first polymer layer comprises PVK (column 5, line 65).

Re claim 12: Jain discloses the quantum dots comprising a first element selected from Group 2 and 12 of the periodic table and a second element selected from Group 16 (column 5, lines 2-3).

Re claim 16: Jain discloses the quantum dots comprising a ZnS capped CdSe quantum dot (column 5, line 3).

Re claim 17: The Examiner notes that the limitation "deposited by spin coating" is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the second polymer layer, the process limitation is afforded no patentable weight.

Re claim 18: Jain discloses, in figures 3 and 4, the quantum dot layers (18,21,22,23) are alternating layers of quantum dots that are soluble in aqueous solvents or organic solvents.

Re claim 19: Jain discloses, in figure 4 and throughout the disclosure, at least one of the quantum dot layers (22) is deposited on top of a second polymer layer (24).

Re claim 20: Jain discloses, in figure 4 and throughout the disclosure, a multilayer polymer quantum dot light emitting diode which comprises alternating layers of quantum dot layers (21,22,23) and polymer layers (14,24,25), wherein the quantum dot layers are soluble in aqueous solvents and the polymer layers are soluble in organic solvents.

Re claim 21: Jain discloses one of the quantum dot layers comprising quantum dots that are the same or different from quantum dots in another quantum dot layer (column 5, line 3).

Re claims 23-25: The Examiner notes that the limitations of "a method of making a multilayer polymer-quantum dot light emitting diode" is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the multilayer polymer-quantum dot light emitting diode, the process limitations are afforded no patentable weight.

Re claim 26: Jain discloses a device (column 1, line 9) which comprises the multilayer polymer-quantum dot light emitting diode.

Claims 1-3,5,6,12,13,16,17 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Miller et al. (US Patent 6,803,719; hereinafter Miller).

Re claim 1: Miller discloses, in figure 1 and throughout the disclosure, a multilayer polymer quantum dot light emitting diode comprising:

- at least one aqueous soluble (column 4, lines 34-44) quantum dot layer (16) between a first polymer layer (11; column 6, line 38) and a second polymer layer (12; column 4, lines 59-65).

The Examiner notes that the quantum dot material disclosed by Miller is considered aqueous soluble. Further, the host matrix material agarose (column 9, line 36) in which the quantum dots are suspended is also aqueous soluble. Therefore, the entire quantum dot layer is considered to be aqueous soluble.

The Examiner further notes that the limitation “a spun coat second polymer” is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, a second polymer layer (12), the process limitation is afforded no patentable weight.

Re claims 2 and 3: The Examiner notes that the limitations “formed using...dots” and “aqueous suspension...stable” is drawn to product by process limitations. While the Examiner has addressed the implied structure produced by the process, a layer of quantum dots (16), the process limitation is afforded no patentable weight.

Re claim 5: Miller discloses at least one of the polymer layers comprising a low molecular weight compound selected from the group consisting of polyaromatics and polyheteroaromatics (column 4, lines 59-61).

Re claim 6: Miller discloses at least one of the polymer layers comprises a high molecular weight compound selected from the group consisting of non-conjugated polymers and conjugated polymers (column 4, lines 59-65).

Re claim 12: Miller discloses the quantum dots comprising a first element selected from Groups 2 and 12 of the periodic table of elements (column 4, lines 52-53) and a second element selected from Group 16 (column 4, lines 55-58).

Re claim 13: Miller discloses the quantum dots comprising a first element selected from Group 13 (column 4, lines 52-53) and a second element selected from Group 15 (column 4, lines 55-58).

Re claim 16: Miller discloses the quantum dots comprising ZnS (column 4, line 52) capped CdSe (column 4, line 56) quantum dots.

Re claim 17: The Examiner notes that the limitation “deposited by spin coating” is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the second polymer layer, the process limitation is afforded no patentable weight.

Re claims 23-25: The Examiner notes that the limitations of “a method of making a multilayer polymer-quantum dot light emitting diode” is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the multilayer polymer-quantum dot light emitting diode, the process limitations are afforded no patentable weight.

Re claim 26: Miller discloses a device (column 1, line 25) which comprises the multilayer polymer-quantum dot light emitting diode.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Coombs et al. (US Patent 6,572,784; hereinafter Coombs).

Jain teaches the above limitations as shown above.

However, Jain fails to teach or fairly suggest that the quantum dots are hydrophilic.

Coombs discloses the use of quantum dots that are hydrophilic (column 11, line 51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Coombs for that of Jain because it allows the quantum dot to remain in a solution for an extended period of time thereby allowing the manufacturing of the device to be at a desired time, rather than instantaneously after the mixing of the solution (Coombs; column 11, lines 52-57).

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Coombs.

Miller teaches the above limitations as shown above.

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However, Miller fails to teach or fairly suggest that the quantum dots are hydrophilic.

Coombs discloses the use of quantum dots that are hydrophilic (column 11, line 51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Coombs for that of Miller because it allows the quantum dot to remain in a solution for an extended period of time thereby allowing the manufacturing of the device to be at a desired time, rather than instantaneously after the mixing of the solution (Coombs; column 11, lines 52-57).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Matsuo et al. (US Patent 6,391,482; hereinafter Matsuo).

Jain teaches all the limitations as shown above, including the second polymer layer comprising an electron conducting polymer.

However, Jain fails to teach or fairly suggest the electron conducting polymer comprising tu-PBD.

Matsuo discloses the use of tu-PBD as an electron conducting layer (column 1, line 50-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the material of Matsuo for that of Jain because the

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choice of materials used for the electron conducting layer is considered to constitute an obvious matter of design based on the availabilities and cost of the materials.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Matsuo.

Miller teaches all the limitations as shown above, including the second polymer layer comprising an electron conducting polymer.

However, Miller fails to teach or fairly suggest the electron conducting polymer comprising tu-PBD.

Matsuo discloses the use of tu-PBD as an electron conducting layer (column 1, line 50-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the material of Matsuo for that of Miller because the choice of materials used for the electron conducting layer is considered to constitute an obvious matter of design based on the availabilities and cost of the materials.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Bawendi et al. (US Patent 6,444,143; hereinafter Bawendi).

Jain teaches all the limitations as shown above.

However, Jain fails to teach or fairly suggest the quantum dot comprising a Group 14 element.

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Bawendi discloses a quantum dot comprising a Group 14 element (column 6, lines 32-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Bawendi for that of Jain because it is more water soluble thereby improving manufacturing of the device (Bawendi; column 6, lines 30-31).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Bawendi.

Miller teaches all the limitations as shown above.

However, Miller fails to teach or fairly suggest the quantum dot comprising a Group 14 element.

Bawendi discloses a quantum dot comprising a Group 14 element (column 6, lines 32-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the quantum dot of Bawendi for that of Miller because it is more water soluble thereby improving manufacturing of the device (Bawendi; column 6, lines 30-31).

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Matsuo.

Jain teaches all the limitations as shown above, including the second polymer layer comprising an electron conducting polymer.

However, Jain fails to teach or fairly suggest the electron conducting polymer comprising tu-PBD.

Matsuo discloses the use of tu-PBD as an electron conducting layer (column 1, line 50-53).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the material of Matsuo for that of Jain or Miller because the choice of materials used for the electron conducting layer is considered to constitute an obvious matter of design based on the availabilities and cost of the materials.

The Examiner notes that the limitation "deposited...by spin coating" is drawn to a product by process limitation. While the Examiner has addressed the implied structure produced by the process, the second polymer layer, the process limitation is afforded no patentable weight.

Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain as applied to claim 1 above, and further in view of Dumbrow et al. (US Patent 6,475,364; hereinafter Dumbrow).

Jain teaches all of the limitations as shown above.

However, Jain fails to teach or fairly suggest a kit which comprises the multilayer polymer-quantum dot light emitting diode.

It is well known to package the device in a kit with instructions, as further evidenced by Dumbrow (column 17, lines 5-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the device disclosed by Jain within a kit having instructions because it would easily convey the instruction of use or installation of the light emitting device in an understandable manner.

Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller as applied to claim 1 above, and further in view of Dumbrow.

Miller teaches all of the limitations as shown above.

However, Miller fails to teach or fairly suggest a kit which comprises the multilayer polymer-quantum dot light emitting diode.

It is well known to package the device in a kit with instructions, as further evidenced by Dumbrow (column 17, lines 5-35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the device disclosed by Miller within a kit having instructions because it would easily convey the instruction of use or installation of the light emitting device in an understandable manner.

Response to Arguments

Applicant's arguments filed 15 November 2005 have been fully considered but they are not persuasive.

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Regarding the rejection under 102(e) of claim 1 in view of Jain:

Applicant argues that Jain does not disclose the layer on the quantum dot layer is a spun coat layer.

The Examiner points out that the limitation of "spun coat" is drawn to a product-by-process limitation. The implied structure of the process has been considered but the process holds no patentable weight.

Applicant further argues that Jain does not disclose an aqueous soluble quantum dot layer.

The Examiner respectfully disagrees. That material in which Jain discloses the quantum dot layer to be comprised of, ZnCdSe/ZnSe or ZnCdSe/ZnSSe, is a known aqueous soluble layer, as further evidenced by Coombs (column 12, lines 10-19).

Regarding the rejection under 102(e) of claim 1 in view of Miller:

Applicant argues that Miller does not disclose a spun coat polymer layer.

The Examiner points out that the limitation of "spun coat" is drawn to a product-by-process limitation. The implied structure of the process has been considered but the process holds no patentable weight.

Applicant further argues that Miller does not disclose an aqueous soluble quantum dot layer.

The Examiner respectfully disagrees. As shown above, the material disclosed by Miller for both the host matrix and the quantum dots are aqueous soluble, as further evidenced by Coombs (column 12, lines 10-19).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., quantum dots sandwiched between layers of conductive polymers or organic molecules) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Regarding the rejection of claims 4 and 15 under 103 of Jain or Miller in view of Coombs:

In response to applicant's argument that Coombs is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Coombs is looked upon to teach why the choice of a hydrophilic quantum dot would be obvious. Quantum dots are used in various fields of endeavor, not just the LED art. The use of a hydrophilic quantum dot is the same no matter the field of

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endeavor. Accordingly, the rejections based on the combination of Jain and Coombs and Miller and Coombs are maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Keaney whose telephone number is (571)272-2489. The examiner can normally be reached on Monday, Tuesday, Thursday, Friday 7:30-6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Elizabeth Keaney
Examiner
Art Unit 2882



EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER